clang vs gcc: waaaaaat?

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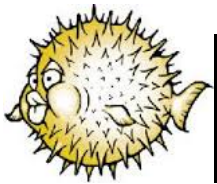


July 17, 2017

Timeframe

- December 17 - first arch using clang, arm64
- April 10 - addition of `LIBCXX` to bsd.port.mk
- April 17 - clang built by default on amd64/i386
- May 5 - emulated tls in clang
- July 1 - kill `depend` in Makefiles
- July 13 - introduce `COMPILER_LIBCXX`

Existing slate

Tools for us

We have dpb and proot! (so building with clang should be easy)

Tools against us

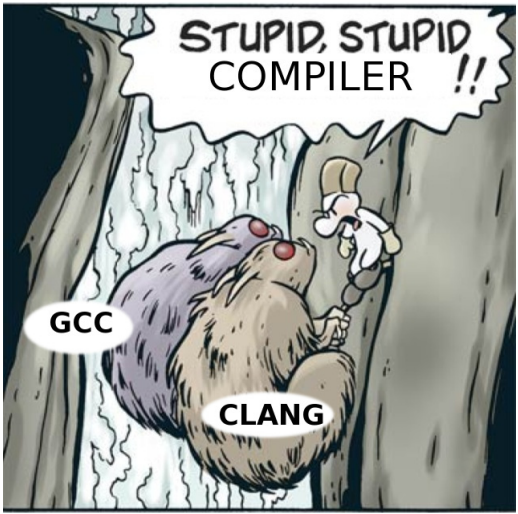
We already have gcc 4.2 in base, gcc 4.9 in ports, and clang in ports.
Plus, those are using *two different versions* of `libstdc++`. clang in base is using `libc++`.
And different linkers...

Build everything

Build everything


meet Poop
THE
EMOJI
MOVIE
JULY 28
283 -049

Compiler woes



sample1

```
cc -O2 -pipe -Wall -g -I. -Werror  -c ole.c
ole.c:677:26: error: comparison of unsigned expression < 0 is always false
        if (h->fat_sector_count < 0) insanity++;
            ~~~~~~~~~~~~~~~~~~~ ^ ~
ole.c:1070:25: error: comparison of unsigned expression < 0 is always false
                                        if (current_sector < 0) break;
                                            ~~~~~~~~~~~~~~ ^ ~
2 errors generated.
```

sample2

```
u_heavy.o: In function ‘Unpack_HEAVY’:
u_heavy.c:(.text+0x71): undefined reference to ‘decode_c’
u_heavy.c:(.text+0xbc): undefined reference to ‘decode_p’
u_deep.o: In function ‘Unpack_DEEP’:
u_deep.c:(.text+0x643): undefined reference to ‘update’
cc: error: linker command failed with exit code 1 (use -v to see invocation)
```

autoconf shitz

C compiler doesn't work.
That's because `int main(int argc, char *argv[])`

more of it

`clang -Whatever` does warn, but does not error out.
So you add the option, add `-Werror` and it explodes!

Low-hanging fruits

- lots of missing headers
- functions that return void/int
- templates are not macros

```
oldfunction()
{
        whatever code
        return; /* note no value, but we don't have void */
}
```

```
oldfunction()
{
        whatever code
        return; /* note no value, but we don't have void */
}

void strangeshit()
{
        /* some code */
        return 0; /* WHY ???? */
}
```

```
In file included from mg_in.cc:22:
./mg_.h:109:17: error: variable has incomplete type 'C_Comment'
    C_Comment   dummy_c_comment;
                ^
./mg_.h:28:7: note: forward declaration of 'C_Comment'
class C_Comment;
      ^
./mg_.h:110:17: error: variable has incomplete type 'Cxx_Comment'
    Cxx_Comment dummy_cxx_comment;
                ^
./mg_.h:29:7: note: forward declaration of 'Cxx_Comment'
class Cxx_Comment;
      ^
```

```
src/message.cpp:39:2: error: use of undeclared identifier 'time'
        time(&timestamp);
        ^
```

WAAAAT 1

```
In file included from /usr/include/c++/v1/iostream:40:
In file included from /usr/include/c++/v1/istream:163:
In file included from /usr/include/c++/v1/ostream:140:
In file included from /usr/include/c++/v1/locale:220:
/usr/include/c++/v1/__bsd_locale_fallbacks.h:51:12: error: use of undeclared
    return wcsnrtombs(__dest, __src, __nwc, __len, __ps);
           ^
/usr/include/c++/v1/__bsd_locale_fallbacks.h:66:12: error: use of undeclared
    return mbsnrtowcs(__dest, __src, __nms, __len, __ps);
```

```
//===---------------------- __bsd_locale_fallbacks.h ----------------------=
inline _LIBCPP_ALWAYS_INLINE
size_t __libcpp_wcsnrtombs_l(char *__dest, const wchar_t **__src, size_t __r
                             size_t __len, mbstate_t *__ps, locale_t __l)
{
    __locale_raii __current( uselocale(__l), uselocale );
    return wcsnrtombs(__dest, __src, __nwc, __len, __ps);
}
```

```
//===----------------------- __bsd_locale_fallbacks.h -----------------------=
inline _LIBCPP_ALWAYS_INLINE
size_t __libcpp_wcsnrtombs_l(char *__dest, const wchar_t **__src, size_t __r
                             size_t __len, mbstate_t *__ps, locale_t __l)
{
    __locale_raii __current( uselocale(__l), uselocale );
    return wcsnrtombs(__dest, __src, __nwc, __len, __ps);
}

#if __POSIX_VISIBLE >= 200809
size_t wcsnrtombs(char * __restrict, const wchar_t ** __restrict, size_t,
    size_t, mbstate_t * __restrict)
__attribute__ ((__bounded__(__wcstring__,1,4)));
#endif
```

Pointers everywhere

```
qg_dialogfactory.cpp:192:44: error: ordered comparison between pointer and z
        while (layerList->find(layer_name) > 0)
               ~~~~~~~~~~~~~~~~~~~~~~~~~~~ ^ ~
```

Pointers everywhere

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qg_dialogfactory.cpp:192:44: error: ordered comparison between pointer and z
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               ~~~~~~~~~~~~~~~~~~~~~~~~~~~ ^ ~
```

```
while (fgets(buf, sizeof buf, f) > 0) {
        ...
}
```

Define some types

```
typedef struct point {
        int x;
        int y;
};
```

```
for (itSocket = m_Sockets.begin();
        itSocket != m_Sockets.end(), socketcounter < socketmax ;
        itSocket++, socketcounter++) {
}
```

Show Stoppers 1

Some stuff wants Thread-Local-Storage.
Ports gcc has emulated TLS...
... turns out clang can have it too (thanks kettenis@)
and it's compatible!

Pthread functions

- `pthread_key_create`
- `pthread_setspecific`

Compiler, what compiler

old style

historically, `bsd.port.mk` was cut into small pieces.
So you do `MODULES = gcc4` to get to gcc. and it gets awful:

```
.include <bsd.port.arch.mk>
.if ${PROPERTIES:Mclang}
WANTLIB += c++ c++abi
.else
MODULES += gcc4
MODGCC_LANGS = c c++
.endif
```

So now we do

```
COMPILER = gcc
COMPILER_ARCHS = amd64
WANTLIB += ${COMPILER_LIBCXX}
```

WAAAT++

```
struct
fast_resampler.cpp:40:52: error: declaration of 'S' shadows template paramet
template<typename T, typename S, template<typename S> class Arithm>
```

```
AutoFilter.cc:72:13: error: call to 'div' is ambiguous
        div_t qr = div (frames, blocksize);
                   ^~~
/usr/include/stdlib.h:107:8: note: candidate function
div_t    div(int, int);
         ^
/usr/include/c++/v1/stdlib.h:120:42: note: candidate function
inline _LIBCPP_INLINE_VISIBILITY  ldiv_t div(     long __x,      long __y) _
                                             ^
```

```
global.cc:374:8: error: cannot initialize a variable of type 'char *' with a
        char *ext = strrchr(filename, '.');
             ^      ~~~~~~~~~~~~~~~~~~~~~
1 error generated.
```

```
./MatrixBase.hpp:371:19: note: must qualify identifier to find this declarat
     inline void matSliceCheck(size_t sourceRowSize,
                  ^
In file included from Bancroft.cpp:31:
In file included from ./Bancroft.hpp:34:
In file included from ./Matrix.hpp:35:
./Vector.hpp:117:13: error: use of undeclared identifier 'assignFrom'
           assignFrom(r);
           ^
           this->
```

```
./MatrixBase.hpp:371:19: note: must qualify identifier to find this declarat
     inline void matSliceCheck(size_t sourceRowSize,
                 ^
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./Vector.hpp:117:13: error: use of undeclared identifier 'assignFrom'
           assignFrom(r);
           ^
           this->
```

thisisnotmyplanetunderstandmonkeyboy

This is called "two phase dependent name lookup"

```
class is_convertible_basic_impl<From, To, false>
{
   typedef char one;
   typedef int  two;

   template<typename To1>
   static void test_aux(To1);

   template<typename From1, typename To1>
   static decltype(test_aux<To1>(boost::declval<From1>()), one()) test(ir

   template<typename, typename>
   static two test(...);

public:
   static const bool value = sizeof(test<From, To>(0)) == 1;
};
```

parting shots

```
/usr/bin/ld: getopt_long.o: relocation R_X86_64_PC32 against ‘optind’
 can not be used when making a shared object; recompile with -fPIC
/usr/bin/ld: final link failed: Bad value cc: error: linker command
 failed with exit code 1 (use -v to see invocation)
```

clang dependencies

- Led straight to nodepends
- More compiler fun! Why does `gcc -MD -MP a.s` behave differently ?